

## Exercise Set

### Principles of Computing

#### Week 2

## 1 Exercises

### shell

1. Suppose you just open up a fresh terminal instance.
  - 1.1. Where are you?<sup>1</sup>
  - 1.2. How do you check to see where you are?
  - 1.3. How can you see what files are in the current directory?
2. Now suppose we run the command `ls`. What should happen?
3. Now suppose we run the command `cd /`. What should happen?
4. What output should we expect to see if we executed the following?

```

1 cd /
2 pwd
3 cd ~
4 mkdir testing_dir
5 cd testing_dir
6 touch this_is_just_a_test_case
7 ls

```

<sup>1</sup> Meaning: what is the full path to where the shell running right now?

### Python

1. What would be the result of running the following block of code?

```

1 def my_first_function():
2     print("Hello, world!")

```

2. Suppose we define the following function.<sup>2</sup>

```

1 def current_score(x, y):
2     irish_points = x + 1000000
3     niu_points = y + 0
4     print("ND points:", irish_points)
5     print("NIU points:", niu_points)

```

<sup>2</sup> *Note*: the `print` function can take more than one input; in such cases, we separate the multiple inputs to `print` with commas, as on lines 4 and 5 of the snippet.

- 2.1. How do we *call* this function on the inputs `14` and `6`?<sup>3</sup> What should we expect to see as a result of running this function?
- 2.2. What if we ran it on the inputs `"0"` and `6`?
- 2.3. What about the inputs `"7"` and `"7"`?

<sup>3</sup> *Calling* a function on some inputs is synonymous with *running it with those inputs*.

3. Suppose we define the string `mystring = "Irish by a million!"`
- 3.1. How do we obtain the *first* character of this string?
  - 3.2. How do we obtain the *last* character of this string?
  - 3.3. How do we obtain the character in the *middle* of this string?

## 2 Solutions

### shell

1. 1.1. A fresh terminal should start you off in your *home directory*, which has the shortcut name `~` for convenience. If your username is `username`, then the full path to home is `/Users/username` on macOS and `/home/username` on Linux.

1.2. `pwd` displays the path to the working directory.<sup>1</sup>

1.3. `ls` displays the files and folders in your working directory.

2. We should see one of the two following error messages, depending on if we are running `zsh` or `bash` as our shell.<sup>2</sup>

```
1 zsh: command not found: ls
```

```
1 bash: command not found: ls
```

3. We should see one of the two following error messages, depending on if we are running `zsh` or `bash` as our shell.<sup>3</sup>

```
1 zsh: no such file or directory: cd/
```

```
1 bash: cd/: No such file or directory
```

Since the first thing the shell expects to see on a line is the *name of a command*, with commands and input arguments *separated by spaces*, the shell looks for a command named `cd/`. There is no such command.<sup>4</sup> When the shell can't find a command, it would normally throw a `command not found` error—as in the previous example; however, in this instance, the shell notices that there is a `/` character in the command you tried to run. The shell now tries to interpret `cd/` as a *path*, starting in the current directory, to a file or command that it should try to run. Of course, since there is no such file or directory,<sup>5</sup> the shell finally gives up and throws the error message we saw above.

4. In that example, only the `pwd` and `ls` commands display any output to the terminal. You should see the following output in order.

```
1 /
2 just_a    test_case this_is
```

### Python

1. This code *defines* a function with the name `my_first_function`. *That's all this block of code does.* If we were to *run* the function, then it would

<sup>1</sup> Your *working directory* is what we call the current location of your shell.

<sup>2</sup> `zsh` is the default shell on newer versions of macOS. `bash` is the default shell on Linux and older versions of macOS.

<sup>3</sup> `zsh` is the default shell on newer versions of macOS. `bash` is the default shell on Linux and older versions of macOS.

<sup>4</sup> unless you've done something *strange* to your computer

<sup>5</sup> unless you've done something *horrible* to your computer

print the message "Hello, world!" to the terminal, but *we didn't run the function*. All we did was *define* it. Therefore, running this block of code *will not display anything to the terminal*.

2. 2.1. We call a function by invoking its *name* followed by *parentheses*, with the *inputs* to the function given inside the parentheses *separated by commas*. To call this function on `14` and `6`, we write the following.

```
1 current_score(14, 6)
```

As a result of running this, we see the following output in the terminal.

```
1 ND points: 1000014
2 NIU points: 6
```

- 2.2. After a stack trace,<sup>1</sup> we should see a `TypeError`.

<sup>1</sup> We will talk about this later.

```
1 TypeError: can only concatenate str (not "int") to str
```

- 2.3. After a stack trace,<sup>2</sup> we should still see a `TypeError`, as before.

<sup>2</sup> We will talk about this later.

```
1 TypeError: can only concatenate str (not "int") to str
```

3. 3.1. Remember that indexing in Python begins at 0.

```
1 mystring[0]
```

- 3.2. The simplest way involves *negative indexing*.

```
1 mystring[-1]
```

However, we could explicitly get the last index instead.

```
1 last_index = len(mystring) - 1
2 mystring[last_index]
```

- 3.3. The middle of the string should be at `len(mystring) / 2`. However, we need to keep in mind that the *index* where a character is *must be an integer!* If you try `mystring[len(mystring) / 2]`, you'll notice that we get an error because the index we are plugging in `len(mystring) / 2` is *not* an integer!<sup>3</sup> To fix this, we need to *cast* that *floating point number* into an *integer number*, which we can do with the `int` function.

<sup>3</sup> This is a `float`, which is the type used for decimal numbers. This type is automatically used for dividing integers because it may not be a whole number.

```
1 middle = len(mystring) / 2
2 mystring[int(middle)]
```